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RECORD OF ORAL HEARING

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHESTER LEDLIE SANDBERG, HAROLD J. VINEGAR,
CHRISTOPHER KELVIN HARRIS, JAIME SANTOR SON,
and FREDERICK GORDON CARL, JR.

Appeal 2010-001040
Application 10/693,700
Technology Center 3700

Oral Hearing Held: Thursday, November 17, 2011

Before LINDA E. HORNER, JOHN C. KERINS, and
STEVEN D. A. McCARTHY, *Administrative Patent Judges*.

ON BEHALF OF THE APPELLANT:

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The above-entitled matter came on for hearing on Thursday, November 17, 2011, commencing at 3:08 p.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, 9th Floor, Alexandria, Virginia, before Jon Hundley, Notary Public.

PROCEEDINGS

THE USHER: Calendar No. 74, Appeal No. 2010-001040. Mr. Meyertons.

JUDGE HORNER: Thank you.

MR. MEYERTONS: Good afternoon.

JUDGE HORNER: Good afternoon. If you have a business card --

MR. MEYERTONS: I do.

JUDGE HORNER: Could you provide it to the Court Reporter?

MR. MEYERTONS: Sure.

JUDGE HORNER: Thank you. We've had an opportunity to review your case.

MR. MEYERTONS: I can't say I'm unprepared now.

(Laughter.)

JUDGE HORNER: You have 20 minutes. You can proceed when you're ready.

MR. MEYERTONS: Okay. One of the big problems in the hydrocarbon production industry is you have these difficult-to-produce hydrocarbons, oil shale, tar sands, things of this nature.

One of the reasons it's difficult to produce is it's thick and viscous. I sound like Sylvester Stallone -- Sylvester the cat.

Anyway, you can't get it out of the formation. The solution is to heat it. The problem is you needs lots and lots of heat, and you have these long distances that you have to heat, and it's a really difficult technical problem to actually heat it to the point where you can mobilize it.

Heating it to just a few degrees is not going to mobilize it. You'd have to heat it significantly over significant periods of time in order to get production on a commercial scale.

So, you have this problem. You've got these heaters. What they do is they put these long heaters, and the problem is that the formations are discontinuous, and it's not homogenous throughout.

What you end up having, and this is an unforeseen problem, you get these hot spots. Some portions of the formation will basically -- especially the richer ones, the ones with the more hydrocarbons in them, what will happen is you will start heating it.

You have this long heater. Typically, let's say it's an electric resistance heater, like we have in these claims. You've got this long electric resistance heater. You're heating this formation. Some places get hotter, and sometimes what will happen in some formations is they will actually expand and crush the heater. Therefore, you have lost millions of dollars on your well.

So, it's a big problem. It wasn't discovered until our client, Shell, discovered it, when they did a pilot in oil shale and this happened to them. They said, “oh, my gosh, you know, this has never happened before, we didn't anticipate this. What do we do?”

They tried lots of solutions. You know, you can try to log the well. You can try to put thicker pieces of pipe in there. The problem with all that is they are inefficient, and you don't really know exactly where you are going to get your spots, where you are going to get this crushing.

What they developed, and it took them years to develop this, but they had a technique where they decided they were going to make those heaters

out of a Curie material, a temperature limited heater, so that -- what happens is you are supplying current and the current is constant, but the electrical resistance in a Curie heater, what happens is if a temperature gets too high, the resistance will suddenly just drop off, and that's great.

That is a wonderful feature for these heaters, and it's a wonderful invention because when you get these hot spots and it gets too hot, it automatically -- basically the temperature gets high enough, the electrical resistance goes to zero, so in that section, it stops heating.

JUDGE McCARTHY: So, the resistance can go to zero locally?

MR. MEYERTONS: Locally, yes. That's a really, really big deal because let's say you're heating 1,000 feet of formation. Well, you know, heating is the name of the game. You're trying to cram as much heat as you can in this formation. If you get one ten foot hot spot -- in the previous systems, if you got a ten foot hot spot, it crushed your well, you're done. Everything is broken. You have to drill a new well. You can't even get the stuff out of the well. If you try pulling it, it just breaks.

With this system, if you get ten foot of hot spot, it will get to the point where it gets hot, the electrical resistance goes to zero, it stops heating. Exactly what you want where you want the heat to stop presenting itself to the formation.

It's a really, really big deal. It makes a huge difference in your ability to -- if you're going to spend billions of dollars to put a bunch of heater wells in a formation, you don't want them all breaking about a year and a half into it, after you have invested all this money and electricity to get them to the point where they're hot.

So, by putting these in, you can have assurance you're not going to have this severe problem.

What happened was we filed this application. We have in our claims several features. Take independent claim 1691. It starts out it is a system configured to heat a hydrocarbon containing formation. I know that's preamble, but that system is referenced later in the claim, so that's brought into the claim.

So, we're talking about something to heat hydrocarbon containing formation, and that's important because the prior art doesn't do that. The main reference, Eastlund, specifically, does not do that.

So, you have a heater wall that extends from the surface through the overburden into the formation. You have to have an AC supply. This only works, by the way, with AC. You can't use it with DC, because the Curie effect doesn't work unless you have AC current.

Then you have electrical conductors in the claims which extend again into the surface of the hydrocarbon containing formation. Of course, they're connected up to the AC supply.

Then the electrical conductors have electrically resistant ferromagnetic material, and that material again has this temperature application, so when it gets to a selected temperature, it basically will drop off and stop heating.

The whole system is configured so that it provides heat to the hydrocarbon containing formation so that you transfer heat to the hydrocarbons and you mobilize the hydrocarbons.

This is a short way of me sort of paraphrasing what is in the claim.

The reason all those things are important is to solve this problem of the crushing. What the Examiner did is he took Eastlund, and he basically combined it with three other references. Of those three references, the Rose reference, I think, is the most important.

The Eastlund reference is the primary reference. He takes Eastlund. In Eastlund, there is a separate problem in the oil industry. I used to be an engineer, by the way, in the oil industry. You have this problem where when you're producing stuff and maybe it's coming out slow, but when it's at the lower levels and you're producing it, no problem, it's hot. Everybody knows the deeper you go in the earth, the hotter it gets.

So, when you're producing this stuff from hundreds of feet below the surface, it's hot, no problem. As it comes to the surface, especially if it's flowing fairly slowly, it will cool. You will form hydrates. The hydrates will form solids. Boom, your well is plugged.

So, Eastlund developed a system to address this problem. The Eastlund system talks about heating from like 73 degrees to 85 degrees F. Very low amounts of heating.

What is he trying to do? Just a little bit of heating to stop the hydrates from forming. He's not doing it in the lower sections of the formation because they're already hot. There's no reason to do it there. There is no reason to heat something which is already 200 degrees and it's not forming hydrates.

What he does, and in all of his drawings, and this is one of the issues that we went back and forth on with the Examiner, he has these heaters that go through down the tubing, it goes down in the upper portions of the

formation, and basically he's just got an electric resistance heater at the very top.

JUDGE McCARTHY: The heater in Eastlund does go into the formation?

MR. MEYERTONS: It does not go into the hydrocarbon formation. It goes into the ground. Did I say "formation?" It goes into the ground. It does not go into the hydrocarbon producing area of the formation.

If you look at his figures, his figures demonstrate that. In all the Eastlund figures, he has these what we call "zigzag broken lines," and if you take, for example, Figure 1. In Eastlund, Figure 1, he's got these zigzag lines right here that separate -- this is the electrically heated portion. This is the portion his patent was directed to, that's why the majority of his drawing is directed to that.

He has these zigzag lines. Those zigzag lines indicate distantly or remotely related. That's well known and established.

The reason why is the perforations down here, 12 are the perforations, that's where the formation is. The oil comes in, the gas comes in. It goes a long distance and then it gets to the upper portions of the formation. When it gets there, it starts to cool off, and that's where he puts his heating.

The Examiner says well, actually Eastlund shows a heater going all the way into the formation. That's not true. It's not a heater well. One of the key limitations -- in fact, really, when you look at Eastlund -- I think it's kind of interesting about Eastlund, it's the primary reference cited, and if I go through each of the features, which I'm going to do in a second of Claim 1691, the independent claim, all the features are not shown in Eastlund, with the exception of an AC supply.

Specifically, the preamble says "[a] system configured to heat a hydrocarbon contained formation." Eastlund doesn't do that. It just simply doesn't. It heats the tubing at the top of a well, not the hydrocarbon containing formation.

"[A] heater well extending from the surface of the earth through an overburden of the formation into a hydrocarbon containing layer in the formation. Eastlund doesn't do that.

Yes, he has a well. All wells by definition go into the hydrocarbon containing formation, but they're not heater wells. Most, 99.99 percent of wells are not heater wells.

He doesn't have a heater well. He has a well that goes all the way down there and then he heats the top of his ordinary well. That's not a heater well and it does not heat the hydrocarbon containing formation.

JUDGE HORNER: Is "heater well" a term of art?

MR. MEYERTONS: No, it's a term in this patent. It's been used in many, many patent applications, especially by Shell, that we have written. There is literally hundreds of these applications that talk about heater wells.

A heater well is a well that provides heat, and specifically in this context, it's a heater well that providing heat to the hydrocarbon containing formation.

JUDGE KERINS: Is there a definition that excludes producing wells from that term?

MR. MEYERTONS: I don't think so, no. I don't think a producing well would be excluded from that, but it has to have -- if the producing well is heating the hydrocarbon formation, that would be a different story.

Eastlund is not doing that. Eastlund is a producing well, but it's certainly not a heater well because it's not heating the formation. It heats the earth, which doesn't contain the hydrocarbons at the top, where the hydrates are going to form because of the cooling. It does not heat the hydrocarbon formation.

Eastlund goes on to say--we have an AC supply configured to provide AC at a frequency between about 100 to about 1,000 Hz. Eastlund in Column 4, lines 19 to 28, talks about going from DC current. You can use DC current or you can go one megahertz. That's a pretty broad range. You can go from zero basically to a million.

We have a range in our claims of 100 to 1,000.

Then he talks about well, maybe you can use 50 to 60 or maybe you can use 100,000.

The AC supply, I think he has an AC supply there. It's arguable whether it's in the range of our claims.

Then we have one or more electrical conductors located in the heater well. At least one of the electrical conductors extending from the surface into the hydrocarbon containing layer. Clearly, Eastlund does not have that. It does not have an electrical conductor that's going into the hydrocarbon containing layer.

"[A]t least one of the electrical conductors being electrically coupled to the AC supply." Again, the AC supply in Eastlund does not connect to an electrical conductor which goes into the formation, the hydrocarbon containing layer.

JUDGE McCARTHY: I presume it's your position that Bell would not teach an electrical conductor coupled to an AC supply?

MR. MEYERTONS: Bell's got a DC supply. The only figure in Bell has a DC supply. The only time they mention AC in Bell is when they say by the way, if you want to supply power to your DC, you can supply it from an AC.

Bell has DC going into the formation. Bell is the least relevant of the references. What they're doing in Bell is dual heating.

They take electrolytes, they inject it in the formation, put an anode here, a cathode here, shoot DC current down here. It goes through the electrolyte, through the formation. As it goes through the electrolyte, it puts off heat, and it releases gas, in Bell.

Bell is not mobilizing. Bell is not using electric resistance heaters. Bell is not using AC current.

With respect to Eastlund, the key limitation in the claim directed to the Curie heating or the temperature limit heating is the limitation about the conductors having electrically resistant ferromagnetic material, an electrical conductor being configured to provide electrical resistant heat output during application of AC to an electrical conductor, and the electrical conductor being configured to provide a reduced amount of heat above or near a selected temperature, the selected temperature being within about 50 degrees C. of the Curie temperature of the ferromagnetic material.

So, it's not just providing any old reduced temperature. It's providing a reduced temperature that's within that range of the Curie temperature of the ferromagnetic material.

In other words, this is specifically designed to have this effect. Nothing in Eastlund about that. In fact, there is nothing in any of the

references at all about that except for Rose. Rose talks about having Curie heaters.

It goes on to say the system is configured to provide heat to the hydrocarbon formation, such as heat transfers from at least one of the electrical conductors to hydrocarbons in the hydrocarbon formation to at least mobilize some hydrocarbons in the formation.

That limitation is important. It's not just configured to provide heat anywhere. You're providing heat to the hydrocarbons in the hydrocarbon formation so that you can mobilize them.

In Eastlund, all he's doing, as I said, is heating the tubing at the top. Is he heating hydrocarbons that's in that tubing? Sure. The hydrocarbons are coming up. The hydrocarbons are not in the formation, and they're not being mobilized.

The only reason those hydrocarbons got there in the first place is because they were mobilized by virtue of the fact they were coming up from pressure under the ground through the tubing. So, they are already mobilized.

One of the things about Eastlund that I've hit upon is the fact that he's heating at the top. Eastlund also says he's heating at the top. In fact, he has in one embodiment talking about having this cable, and he says, and I quote, "It is preferred to form the lower section or sections of the cable such that the resistance is lower." Lower resistance is going to give you less heating.

"This results in more heating being released in upper sections of the well." That is Column 9, lines 63 through 66.

He's basically saying exactly what I'm saying, heat the stuff at the top, because that's where it is going to cool. Don't heat the bottom. In fact, it's preferred that you heat the top.

When you really look at Eastlund, the primary reference cited, not one feature of the independent claim, with the exception of the AC supply, is taught in Eastlund.

One of the things that the Examiner is saying is well, you know, you can take Eastlund and you can combine it with these other references.

All right. Let's say you combine it with Rose. Rose teaches a Curie heater. In fact, it has great details about Curie heaters. Rose doesn't teach anything about heating a formation, wells, conductors, mobilizing, any of the key features in this claim. None of those features are taught at all by Rose.

The other references, Bell, which I think is clearly the least relevant of the references, as I pointed out, has DC source. It doesn't have anything to do with electrical resistance heating. It doesn't have anything to do with Curie heating or temperature limiting heating. It doesn't have anything to do with these features.

I might add that in Bell, he talks about making sure you heat to less than 500 degrees. In one of our dependent claims, we talk about heating to at least 650 C., which is 1,200 degrees. That's a big difference when you're heating under the ground. You're talking about different metallurgy, completely different technology.

The last reference is Van Egmond. Van Egmond, it has a heating system in it, and it's cited for the purpose of showing heating from the

surface going down into the formation. That's true, but Van Egmond doesn't have anything to do with a temperature limiting heater.

In fact, Van Egmond, I think, is kind of interesting because Van Egmond is a 1991 reference. It's a Shell reference. As I said to you, the Curie heater works by dramatically lowering the resistance when the temperature of the material gets to a certain temperature. By lowering the resistance, you get less heat.

Van Egmond says, and he teaches away from this concept when he says, "A resistance which varies significantly with temperature would cause the current required to vary excessively." This is Column 5, lines 27 through 29.

Van Egmond didn't have any recognition of this crushing problem. Any recognition, there was no teaching about this crushing issue, but Van Egmond says whatever you do, you don't want to make sure that your resistance goes down dramatically or significantly with temperature, which is exactly what our claims say, and what our claimed system does. It's exactly opposite.

I would like to point out one thing, which we put it in the information disclosure statement. In fact, we asked for reconsideration.

I was in an appeal about six months ago here, I think, in this room. We had a similar claim. It's not exactly the same, but the rejection was a different reference, Pritchett, instead of Eastlund. It was rejected in view of Rose and Van Egmond and some other references.

It basically was a Curie heating system. Pritchett was a system that was used to heat the top of a well, just like Eastlund. We got a decision on

that case in August of this year, and in that decision, they reversed the Examiner and said that the claims were allowable over that cited art.

We submitted that in an IDS. I have a copy. If I can help you guys by providing a number or copy, I'd be happy to.

JUDGE McCARTHY: We've already had an opportunity to review that opinion.

MR. MEYERTONS: All right; good. What I thought was the most pertinent thing about that opinion because it applies exactly in this case is that the Board said the main reference did not teach hydrocarbon heating, no matter how you read it, it doesn't teach hydrocarbon heating.

That's exactly what the case is with Eastlund. It is exactly the same in this case.

JUDGE KERINS: Counsel, you mean hydrocarbon formation heating?

MR. MEYERTONS: Excuse me, I'm sorry. Hydrocarbon formation heating, yes.

The Board also said that Rose, even if it was inserted into the main reference, wouldn't heat a hydrocarbon layer. That's exactly the case here. If you took the Rose Curie heaters, you put them into the Eastlund system, you'd be heating to about 85 degrees F., first of all. You wouldn't mobilize. You wouldn't be in the hydrocarbon layer. You wouldn't be near the hydrocarbon layer. You wouldn't heat the hydrocarbons in the formation, even if you took Rose and put it in there.

Finally, I thought what was a good point is that even if you took all those things, even if you could take Rose, which is outside the field of this art, but if you took it and you put it in there, why would a person do this?

You have the Eastlund system. He's heating to 85 degrees. You have this crushing problem which is unrecognized in any of the art. What would the motivation, suggestion -- why would you take and heat with a curie heater, which is more expensive and difficult to make, why would you put something like that in the Eastlund system when Eastlund is already using an electric resistance heater?

He doesn't have any problems with crushing. You go to 85 degrees F., I promise you, he's not going to have a problem with crushing.

There is no reason to do it. There is no reason why anybody would be motivated, suggest or taught to do it.

Anyway, that kind of sort of summarizes our positions on this. I'm glad to hear you guys have seen that previous Board decision. I thought that was an interesting decision.

JUDGE HORNER: Any further questions?

JUDGE KERINS: I actually do have one question, point of clarification. You have the claim limitation that talks about the electrical conductor being configured to provide a reduced amount of heat above or near a selected temperature, and that temperature being within 50 degrees of the Curie temperature.

MR. MEYERTONS: Yes.

JUDGE KERINS: That's a function of the material you selected, is that not correct?

MR. MEYERTONS: It is.

JUDGE KERINS: Okay.

MR. MEYERTONS: It is going to be -- if you don't select the right materials, some metals, it won't work. It just won't do it, because you won't have the Curie effect.

In fact, you have to carefully select those materials. You have to select which temperature you want. What you do -- in real life, what's really done is you say okay, look, I want to crank as much heat as I can into this formation. My metallurgy is my limiting factor though.

I get to about 1,300/1,350. Get hotter than that, everything starts melting, breaking, twisting.

I'm going to drive for say 1,270 degrees. I want it to cool if it gets any hotter than say 1,300 degrees, 1,350, 1,320 degrees. You design the metallurgy in that electrically resistant section so that metallurgy has that feature.

JUDGE KERINS: Thank you.

MR. MEYERTONS: All right. Thanks so much for your time.

JUDGE HORNER: Thank you.

(Whereupon, at 3:31 p.m., the proceedings were concluded.)